SE 12 - IoT Documentation

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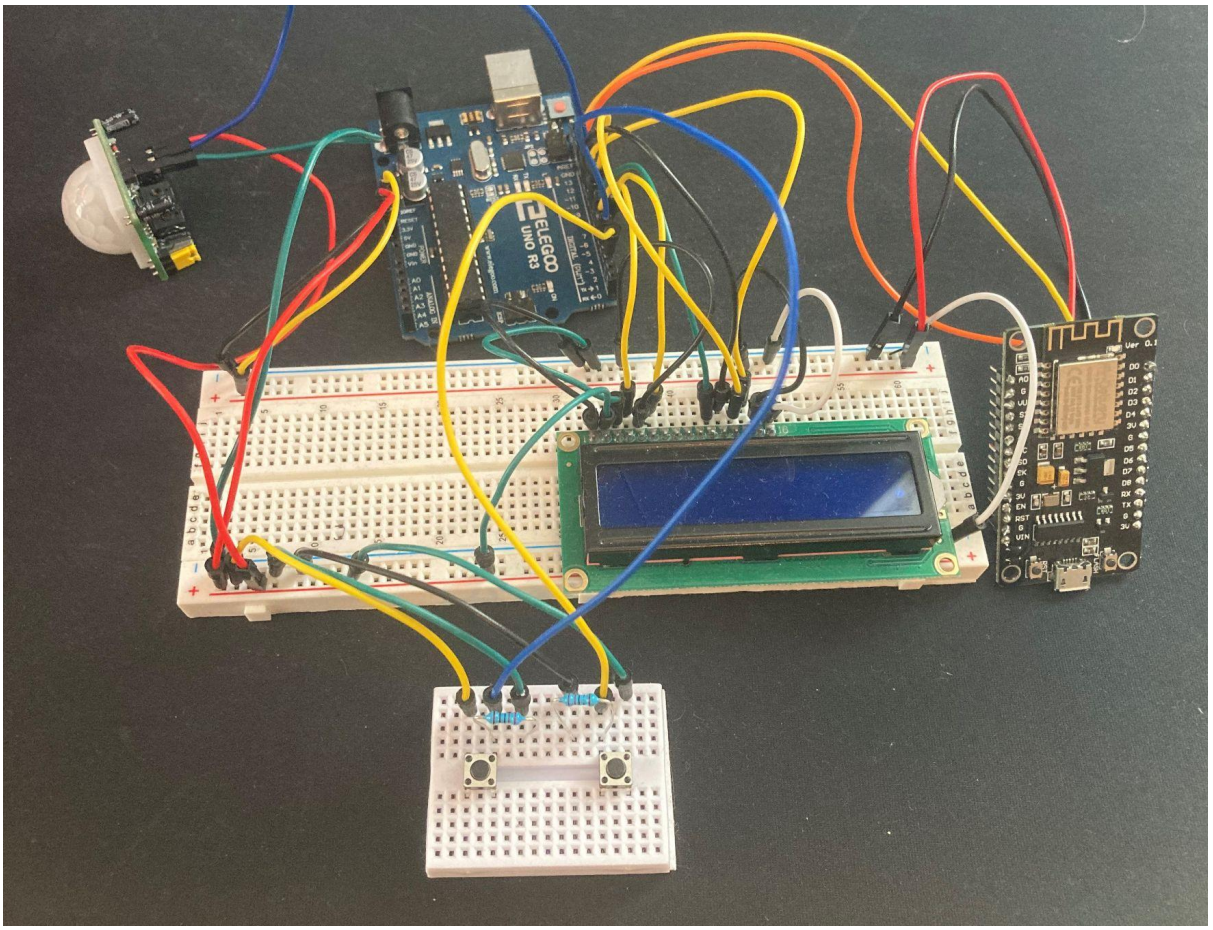
Documentation



System Overview

My project idea for this module was a small device that acts as a remote control unit for my living room smart home lamp. It includes an ESP8266-12E wifi module, two buttons, an LCD display, and an Arduino Uno (also a smart home lamp connected to the internet). I have two Arduino applications running on the Uno and the ESP module to control and connect all these parts. The two buttons can change the state of the lamp and the LCD display acts as an interface for the user. The ESP module communicates over HTTP with an online service (IFTTT) to change the state of the lamp (HTPPS was also possible here, but added some unnecessary complexity for now).
On the GitHub page, the “arduino.ino” file is running on the Arduino and the file called “wifi_programmer” is running on the ESP module. It is important to note here that most of the logic and sensors are running over the Arduino and the ESP module only takes care of the HTTP triggers even though it is capable of running the application itself (not possible in practice, since the LCD display needs too many ports).

Design Choices

Main Controller

Requirements

- Able to run Arduino software
- 11 I/O pins
- 5V and 3.3V outputs for ESP modules (some get damage above 3.3V)

Options

Option	Link	Costs	Pins	Outputs
Arduino Uno	here	~20€	14	5V, 3.3V
Arduino Micro	here	~18€	20	5V, 3.3V

Since most Arduino boards have very similar specs, it doesn’t really matter which one we use. If size and price are important, it is possible to use a Micro, but because it has no USB connector, a PC connection is a little bit more of a hassle. I already had the Uno at home, so I decided to stick with it. In a real-world scenario, it would make sense to pick a smaller controller to minimize size.

LCD Display

Requirements

- Two rows for data visualization

Options

Option	Link	Costs
16X2 Character LCD Display	here	~7€

Since I didn't have any complex requirements here and only wanted to display minimal data, my only real option was the 16x2 display mentioned above. It is cheap and fairly easy to connect and use. I could have connected more complicated Displays with higher resolution, but chose not to consider those in the first place.

WIFI Module

Requirements

- 2 available I/O pins
- HTTP able

Options

Option	Link	Costs	Pins
ESP8266-01	here	~3€	0(4)
ESP8266-12E NodeMCU V3	here	~7€	11

The variety of available options for wifi modules is huge. The ESP01 has 4 pins available if not used but makes them harder accessible and not easy to use. For easy of use reasons, I also looked into the more complicated ESP-12E and had success very fast. I stuck with it for the rest of the project but decided to get the ESP-01 to work again later on, since it has a massive power and size advantage.